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SUPPLEMENTARY INFORMATION ON THE LENINGRAD CONFERENCE ON ACOUSTICS

The following gives further information on the conference of the Acoustics Commission, Academy of Sciences USSR, held in Leningrad.

The report by A. A. Kharkevich on "Spectra and Analysis" contained part of the material of a book which he is preparing to publish. Several theorems on spectra of a dual nature were stated, and the relationship between spectrum width and the time required for its establishment was given. Kharkevich also discussed the problem of the resolving power of a resonator and the analysis of single impulses with the help of resonators.

In his report, "Problems of Sound Analysis," Professor A. V. Rimskiy-Korsakov, Leningrad, discussed the continuous spectral analysis of transient processes, introducing the concept of the "flowing spectrum," which is a spectral function of the part of the process from its beginning to the moment of observation. From this standpoint, Rimskiy-Korsakov believes that the diffraction grating has certain advantages [sic].

Professor S. N. Rihewkin of the chair of acoustics at Moscow State University gave his ideas on the propagation of waves in pipes and on the formation of the field near a diffraction grating in his report, "Visualization of Space-Modulated Sound Waves."

I. M. Brekhovskikh, Doctor of Physicomathematical Sciences, Acoustics Laboratory, Physical Institute, Academy of Sciences, submitted a report, "The Theory of Total Reflection." He gave results of his work on the displacement of a pencil of rays in total reflection, a problem which has again drawn the attention of physicists.

50X1-HUM

- 1 -

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In his report, "Scattering of Sound by Fluctuations," L. A. Chernov, Candidate in Physicomathematical Sciences, Yaroslavl' Pedagogical Institute, cited calculations for several practical cases of scattering by the fluctuation inhomogeneities of a medium. These calculations permit one to establish, in particular, the frequencies at which attenuation caused by scattering will exceed attenuation caused by absorption.

A report on "The Physicochemical and Biological Action of Ultrasonic Waves" was submitted by I. Ye. El'piner, Doctor of Biological Sciences, Academy of Medical Sciences USSR. El'piner cited results of some experiments on the irradiation of a number of organic compounds of biological origin by ultrasonic waves of high intensity (causing cavitation). These results showed that it is possible, in some cases, to cause reactions with ultrasonic waves which heretofore have been observed only in living organisms.

In the section on piezoelectricity, five reports were submitted by representatives of Moscow scientific research institutes. Engineer P. V. Anan'yev reported on the development of piezoelectric measuring microphones in which synthetic crystals of monosubstituted phosphate ammonium [sic] having a high piezoelectric effect were used as the electromechanical transducer. The use of these crystals made possible the design of a small instrument (of 15-mm diameter in a container), and vacuum assembly of the microphone cup, preventing the penetration of water vapor into it, provided highly durable insulation. Data obtained by exhaustive tests showed that the PIEM-3 microphone meets all requirements for a measuring microphone and can be considered a primary standard. This microphone has an absolute sensitivity in the axial direction of 24 mv per bar in the 30-14,000 cycle range, a natural frequency of more than 40 kc, a capacitance of about 120 pfd, and it can be used for measurements at temperatures from -40° to +60° C. The conference noted the value of this work and the need for further tests of these microphones in the All-Union Scientific Research Institute of Metrology to establish a standard measuring microphone.

V. A. Krasil'nikov, Moscow State University, reported on measurements of Young's modulus for slabs of Rochelle salt under dynamic conditions. Krasil'nikov obtained data on the velocity of longitudinal waves in Rochelle salt, established the value of all its elastic constants, and compared this data with results obtained by other researchers.

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Engineer I. M. Polkovskiy reported on the subject, "The Use of an Instrument With a Thermistor to Measure Noise and Speech Levels." From the physiological characteristics of hearing, Polkovskiy developed the idea of using in measuring instruments an indicator which would average the value of sound pressure (or intensity) over a comparatively long time interval. He demonstrated the circuit of an instrument equipped with a thermistor, noted the advantages of an indirectly heated thermistor, as compared with a direct-heating type, and described methods for calibrating such instruments. Polkovskiy cited results of an analysis of noises measured by this instrument and pointed out the feasibility of using the instrument as an indicating element in a noise meter.

A report on "A Universal Measuring Device to Test Electroacoustic Equipment" was submitted by Engineer A. G. Muratov, Leningrad. Three variations of the device were developed, two for shop, and one for laboratory tests of loudspeakers. All three types have an automatic system for controlling and checking of the operation. The average output in this equipment is indicated directly in bars, and the variation of the frequency response is indicated in decibels. The testing of loudspeakers consists of measurements of their seven basic parameters. In two types, the frequency response can be observed directly on the screen of a cathode-ray tube. The device can also be used to test microphones and telephones.

I. I. Slavin, Leningrad, reported on the development of an objective noise meter with a natural scale of volume and demonstrated a small, portable, experimental model. G. N. Stoykov, Moscow, demonstrated the first commercial model, which was built at the experimental plant of the Ministry of the Communications Equipment Industry, where these noise meters are being put in production.

Yu. M. Sukharevskiy, Doctor of Technical Sciences, Moscow, reported on "A Method of Measuring the Modulus of Elasticity and Attenuation Factor of Materials." The "electromechanical Q-meter" developed by Sukharevskiy permits one to determine the modulus of elasticity and attenuation factor of materials in the 10-1,000 kc band by measuring the electrical capacitance and losses of a piezoelectric plate in mechanical contact with the specimen to be tested. The values of Young's modulus and the attenuation factor of aluminum and various plastics were investigated at a frequency of 20 kc. Aluminum was found to have the smallest factor (about  $10^{-5}$ ) in plastics (plexiglass, polyvinylchloride), the factor was  $5 \times 10^{-2}$ , with a Young's modulus of  $7 \times 10^{10}$ . In synthetic rubber, the shear modulus was  $5 \times 10^7$  at a temperature of  $+15^{\circ}\text{C}$ , and the shear attenuation factor was 2.5; at lower temperatures, the shear modulus increased sharply, and the attenuation factor increased more slowly. A change in static pressure from one to 10 atm did not cause any observable effect.

A. P. Poloskin, assistant at Moscow State University, reported on a device for automatic factory checking of microphones and telephones. A method of testing electroacoustic devices based on the achievements of automatic machine radiotelegraphy was used in the development of this equipment; tests may be made using any parameters and any frequency. Since the process is completely automatic, the time required for one test is only 0.2 sec, and the subjective factor is eliminated. The equipment has a counting relay and a continuously operating check on correct operation. A check of the operating principle of the equipment on a model demonstrated its feasibility.

50X1-HUM

- 3 -

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In addition to Fedorovich's report, a short report was submitted on the possibility of using vibrations of an acoustic probe for measurements. By measuring the sound pressure developed by a vibrating body with the probe, one can determine the speed of vibrations.

S. Ya. Lifshits, Moscow, submitted two reports: "Standardization of Measurements of the Threshold of Audibility" and "The Discrete Property of Sensations." In his first report, Lifshits emphasized that the development of knowledge on how the hearing sensation develops at the threshold and the presence of new, previously unknown effects force scientists to make measurements of the hearing threshold more accurate. He proposed that along with standardization of acoustical conditions in the measuring chamber, a number of standard values should be adopted for measurements (duration of the sound impulse, interruption between pulses, etc.). In the second report, Lifshits pointed out that the human ear is a ballistic device, sensitive to doses of sound energy, which is confirmed by the phenomenon of accumulation, i.e., the hearing sensation does not appear until a certain dose of sound energy has been accumulated. Fluctuation of the hearing threshold shows that for weak sound intensities the hearing sensation is discrete and consists of separate elements. The number of these elements can be determined by subjecting the experimental data to statistical processing from the probability theory standpoint.

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